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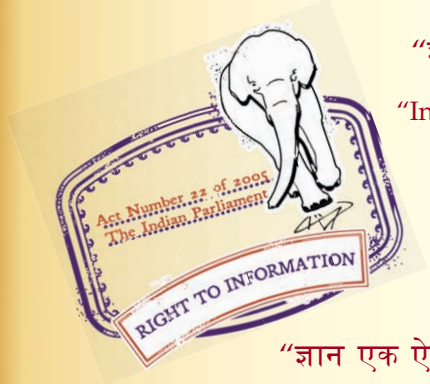
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GENERAL REQUIREMENTS FOR MAGNETIC SOUND TAPE RECORDING AND REPRODUCING SYSTEMS

(First Revision)

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Indian Standard

GENERAL REQUIREMENTS FOR MAGNETIC SOUND TAPE RECORDING AND REPRODUCING SYSTEMS

(First Revision)

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Indian Standard

GENERAL REQUIREMENTS FOR MAGNETIC SOUND TAPE RECORDING AND REPRODUCING SYSTEMS

(First Revision)

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 22 April 1981, after the draft finalized by the Recording Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This Indian Standard covers the general requirements for magnetic sound tape recording and reproducing systems.

0.3 This Indian Standard was originally published in 1967. The revision has been undertaken to include the latest requirements of magnetic tapes including cassettes and tape recording equipment. Other Indian Standards so far published in this series are:

IS : 4479-1981 Methods of measurements on magnetic tapes for sound recording and reproduction (*first revision*)

IS : 4480 (Part I)-1967 Magnetic tapes for sound recording and reproduction : Part I Domestic grade

IS : 4480 (Part II)-1974 Magnetic tapes for sound recording reproduction : Part II Professional grade

IS : 6370-1981 Tape cassettes for domestic use (*first revision*)

IS : 7068-1973 Specification for 6·25 mm calibration tape

IS : 7594 (Part I)-1978 Magnetic sound tape recording and reproducing equipment (cassette) : Part I Methods of measurement

IS : 7594 (Part II)-1979 Magnetic sound tape recording and reproducing equipment (cassette) : Part II Domestic type

IS : 8152-1976 Method of measurement of speed fluctuations in sound recording and reproducing equipment

IS : 8234-1976 Spools for magnetic tapes for sound recording and reproduction

IS : 8655 (Part I)-1977 Magnetic sound tape recording and reproducing equipment (reel-to-reel) : Part I Methods of measurement

IS : 8655 (Part III)-1978 Magnetic sound tape recording and reproducing equipment (reel-to-reel) : Part III Professional type

0.4 While preparing this standard assistance has been derived from the following documents issued by the International Electrotechnical Commission :

IEC Doc : 60A (C.O.) 54 Draft—Revision of IEC Publication 94 : Magnetic tape recording and reproducing systems Part 1 : General conditions and requirements.

IEC Doc : 60 A (Sectt) 77 Revision of IEC Publication 94 Draft-Proposal for IEC Publication 94 Part 6 : Reel-to-reel systems. Mechanical requirements and dimensions, including reels, hubs and relevant track allocations.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the mechanical requirements for the magnetic tape; electrical requirements for the magnetic recording and reproducing system; and tape programme identification. It includes requirements for reel-to-reel and cassette recording/reproducing systems including non-perforated magnetic tapes and magnetic tape records. This standard excludes high-speed duplicating equipment.

2. TERMINOLOGY

2.1 For the purpose of this standard, the terms and definitions given in IS : 1885 (Part XLVIII/Sec 1)-1978† shall apply.

3. DESIGN

3.1 The magnetic sound tape recording and reproducing system shall be so designed as to be capable of operation and storage at ambient temperature ranging from −10° to +55°C and relative humidity not exceeding 95 percent.

*Rules for rounding off numerical values (*revised*).

†Electrotechnical vocabulary: Part XLVIII Recording, Section 1 Tape recording.

4. RADIO INTERFERENCE

4.1 The limits of the radio interference from tape recorder shall not exceed those specified in 7 of IS : 6842-1972*.

5. SAFETY

5.1 In so far as mains operation of the equipment is concerned, it shall conform to the requirements specified in IS : 616-1957†.

6. UNITS AND SYMBOLS

6.1 The letter symbols for quantities and units shall be in accordance with relevant Indian Standards or as specified.

7. MECHANICAL AND ELECTRICAL MATCHING REQUIREMENTS

7.1 The mechanical design features for the connectors used shall be in accordance with relevant Indian Standards or as specified.

7.2 The preferred matching values shall be in accordance with relevant Indian Standards or as specified.

8. MECHANICAL SPECIFICATION

8.1 Tape Dimensions

Tape width	*Tape thickness*
$50{\cdot}80^{\ 0}_{-0{\cdot}1}$ mm	0·055 mm *Max*
$25{\cdot}40^{\ 0}_{-0{\cdot}1}$ mm	
$12{\cdot}70^{\ 0}_{-0{\cdot}1}$ mm	
$6{\cdot}30^{\ 0}_{-0{\cdot}06}$ mm	
$3{\cdot}81^{\ 0}_{-0{\cdot}05}$ mm	0·020 mm *Max*

*Limits for radio interference.

†Code of safety requirements for mains-operated radio receivers.

8.2 Tape Speed

8.2.1 The rated speeds during reproduction shall be in a geometrical progression with the divisor 2 commencing at 76·2 cm/s. The speed and tolerances apply to machines operating from supplies having frequencies and voltages as specified by the manufacturer.

The rated tape speeds and relative characteristics shall be as follows:

Use	*Tape carrier*	*Rated speeds cm/s*	*Tolerances on speed, percent*	*Wow and flutter, percent*
Professional	Reel-to-reel	76·2	±0·2	± 0·1
		38·1		
		19·05		± 0·15
	Cartridge	19·05		
Commercial tape records, recording only	Reel-to-reel	19·05	±0·5	± 0·2
	Cartridge	9·53		± 0·3
	Cassette	4·76		± 0·5
Domestic	Reel-to-reel	19·05	±2	± 0·2
	Cartridge	9·53		Under considera-tion
	Cassette	4·76		± 0·6

8.3 Direction of Tape Winding for Tape Records

8.3.1 *Reel-to-Reel* — If the top surface of a spool is distinguished by markings, by a label or because of an asymmetrical construction, the tape shall be wound in such a way that during reproduction it may be unwound in an anti-clockwise direction:

a) *For professional programme exchange* — the magnetic coating should preferably face the centre of the reel.

b) *For domestic use* — the magnetic coating shall face the centre of the reel.

8.3.2 *Cassette for Professional Programme Exchange, and Domestic Use* — The magnetic coating shall face the openings at the front of the cassette.

8.4 Designation, Allocation and Dimensions of Magnetic Tracks

8.4.1 *Designation of Magnetic Tracks* — Under normal operation, the designation of magnetic tracks shall be as follows:

a) *Reel-to-Reel* — If the tape moves from left to right with the magnetic coating facing away from the observer and with the leader to the right, the top track is designated No. 1 track, the next lower track is designated No. 2 track, and so on.

b) *Cassette* — If the tape moves from left to right with the magnetic coating side facing towards the observer, with the leader to the right and side 1 (*A*) uppermost, the bottom track is designated No. 1 track, the next upper track is designated No. 2 track, and so on.

8.4.2 *Allocation and Dimensions of Magnetic Tracks for Reel-to-Reel Tape* — (*See* Fig. 1).

8.4.2.1 *Tapes for professional programme exchange*

a) *Monophonic* — A single track shall extend over the whole width of the tape.

b) *Stereophonic*

i) Two tracks shall be recorded in the same direction, No. 1 track shall carry the recording for the left-hand channel, as viewed from the listening position; No. 2 track shall carry the recording for the right-hand channel.

ii) The track shall be recorded with the hand-gaps in line and phased for reproduction on equipment so connected that when a full track tape is reproduced it produces in-phase sound pressures at the right- and left-hand loudspeakers.

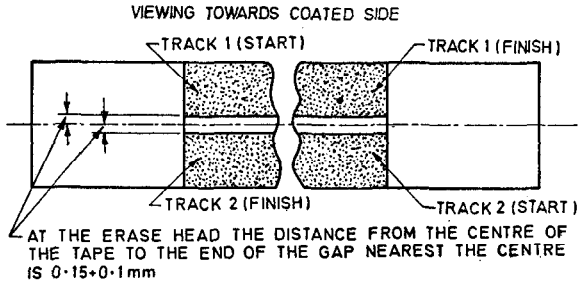
iii) Both tracks shall be recorded to the respective outer edges but a guard track at least 0·75 mm wide in the centre of the tape shall be left free from intentional recording.

NOTE — A guard track width of 2 mm is sometimes used.

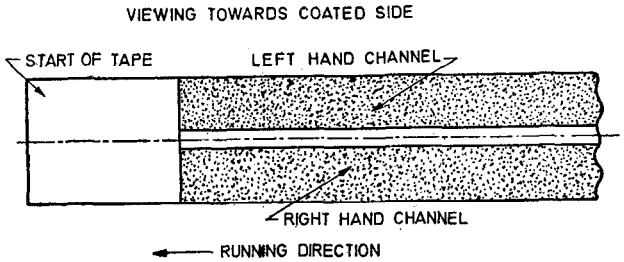
8.4.2.2 *Domestic tape records*

a) *Monophonic two-track tape records*

i) Two tracks shall be recorded in sequence in alternate directions, No. 1 track first, No. 2 track second.

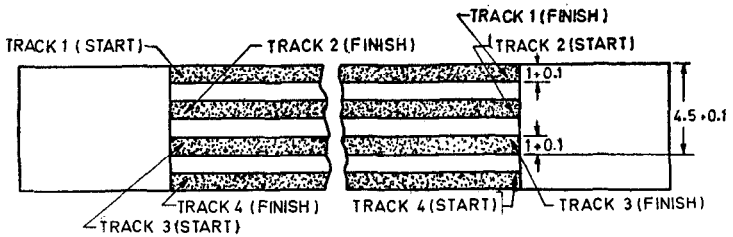

VIEWING TOWARDS COATED SIDE
TRACK 1 (START)
TRACK 1 (FINISH)
TRACK 2 (FINISH)
TRACK 2 (START)
AT THE ERASE HEAD THE DISTANCE FROM THE CENTRE OF THE TAPE TO THE END OF THE GAP NEAREST THE CENTRE IS 0·15+0·1 mm

1A Position, Arrangement and Recording Direction for Single Channel Two-Track Recording

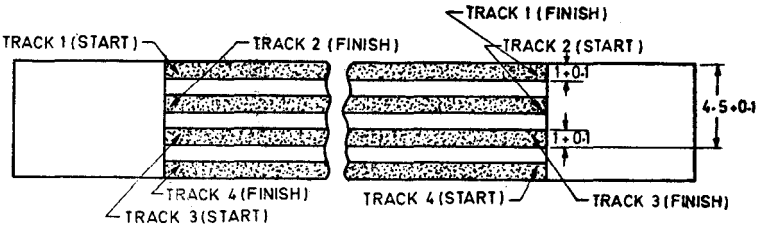


1B Position, Arrangement and Recording Direction for Stereophonic Two-Track Recording

NOTE — The gaps for the two tracks are not offset in the running direction.



1C Position, Arrangement and Recording Direction for Single-Channel Four-Track Recording



1D Position, Arrangement and Recording Direction for Stereophonic Four-Track Recording

NOTE — Recording carried out in the following track sequence 1 (left-hand channel) plus 3 (right-hand channel) and 4 (left-hand channel) plus 2 (right-hand channel).

FIG. 1 ALLOCATION AND DIMENSIONS OF MAGNETIC TRACKS FOR REEL TO REEL TAPE

ii) Both tracks shall be recorded to the respective outer edges but a band at least 0·75 mm wide in the centre of the tape shall be left free from intentional recording.

NOTE — A guard track of 2 mm is sometimes used.

b) *Stereophonic two-track tape records*

i) Two tracks shall be recorded in the same direction. No. 1 track shall carry the recording for the left-hand channel as viewed from the listening position; No. 2 track shall carry the recording for the right-hand channel.

ii) The tracks shall be recorded with the head-gaps in the line and phased for reproduction on equipment so connected that when a full track tape is reproduced it produces in phase sound pressures at the right- and left-hand loudspeakers.

iii) Both tracks shall be recorded to the respective outer edges, but a guard track at least 0·75 mm wide in the centre of the tape shall be left free from intentional recording. The minimum figure should be used primarily to ensure a maximum of compatibility between two-track records and machines suitable for reproduction of four-track records [*see* **8.4.2.2** (c) and (d)].

c) *Monophonic four-track tape records*

i) The tracks shall be recorded in alternate directions in the sequence 1-4-3-2.

ii) The pole width of the recording head shall be:
$1{\cdot}0\ ^{+0{\cdot}1}_{-0}$ mm

iii) The distance between the outer edges of tracks 1 and 3 or of tracks 2 and 4 shall be:

$4{\cdot}5 \pm {}^{0{\cdot}1}_{0}$ mm

iv) Tracks 1 and 4 shall be so positioned that their outer edges coincide with the edges of the tape when the tape width is at minimum.

d) *Stereophonic four-track tape records*

i) Tracks 1 and 3 shall be used simultaneously for one direction of tape travel, tracks 2 and 4 for the other direction.

ii) Tracks 1 and 4 shall carry the recording for the left-hand channel as viewed from the listening position, tracks 3 and 2 shall carry the recording for the right-hand channel.

iii) The tracks shall be recorded with the head-gaps in line and shall be phased for reproduction on equipment so connected that when a full track tape is reproduced it produces in-phase sound pressure at the right- and left-hand loudspeakers.

iv) The pole width of the recording head shall be:

$1{\cdot}0 \pm {}^{0{\cdot}1}_{0}$ mm

v) The distance between the outer edges of tracks 1 and 3 or of tracks 2 and 4 shall be:

$4{\cdot}5 \pm {}^{0{\cdot}1}_{0}$ mm

vi) Tracks 1 and 4 shall be so positioned that their outer edges coincide with the edges of the tape when the tape width is at minimum.

8.4.3 *Allocation and Dimensions of Magnetic Tracks for Cassette Tape for Domestic Use* (See *Fig.* 2).

8.4.3.1 *Monophonic* — Tracks 1 and 2 shall be recorded simultaneously identically, possibly including the spare tracks, for one direction of tape travel; tracks 3 and 4 likewise for the other direction.

8.4.3.2 *Stereophonic* — Tracks 1 and 2 shall be used simultaneously for one direction of tape travel as recorded side 1, tracks 3 and 4 for the other direction as recorded side 2.

Tracks 1 and 4 shall carry the recording for the left- hand channel as viewed from the listening position; tracks 2 and 3 shall carry the recording for the right-hand channel.

The track shall be recorded with the head-gaps in line and perpendicular to the direction of tape movement and shall be phased for reproduction on equipment so connected that when tracks with a phase additions relationship are reproduced in phase, sound pressure at the right- and left-hand loudspeakers results.

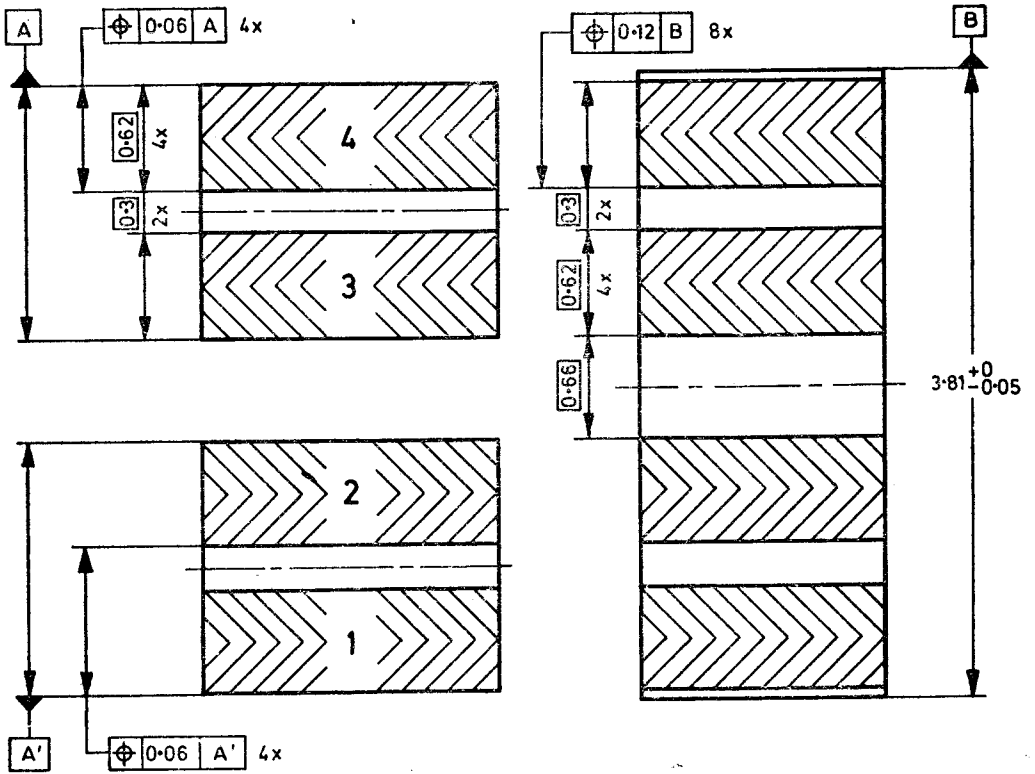


FIG. 2 CASSETTE TRACK ALLOCATION FOR COMMERCIAL TAPE RECORDS AND FOR DOMESTIC USE

9. ELECTRICAL REQUIREMENTS

9.1 Amplitude/Frequency Response of the Recorded Short-Circuit Flux

9.1.1 With constant amplitude sine-wave signal at the input of the recording system, the nominal characteristics of the short-circuit magnetic tape flux versus frequency shall be that which results from the combination of two curves:

a) One falling with increasing frequency in conformity with the impedance of a parallel combination of a capacitance and a resistance having a time constant t_1.

b) The other falling with increasing frequency in conformity with the impedance of a series combination of a capacitance and a resistance having a time constant t_2.

In some cases, only the curve of the constant t_1 is used, that is, t_2 equals infinity.

The combined curve is defined (in decibels) by:

$$N\,(dB) = 10 \log \left(1 + \frac{1}{4\pi^2 f^2 t_2^2} \right) - 10 \log (1 + 4\pi^2 f^2 t_1^2)$$

where

f is the frequency in Hertz, and

t_1 and t_2 are the time constants in seconds.

NOTE — The short-circuit magnetic tape flux versus frequency of calibration tapes, as specified, has to meet the requirements as specified above, these calibration tapes shall be used to set up the frequency response of the reproducing chain.

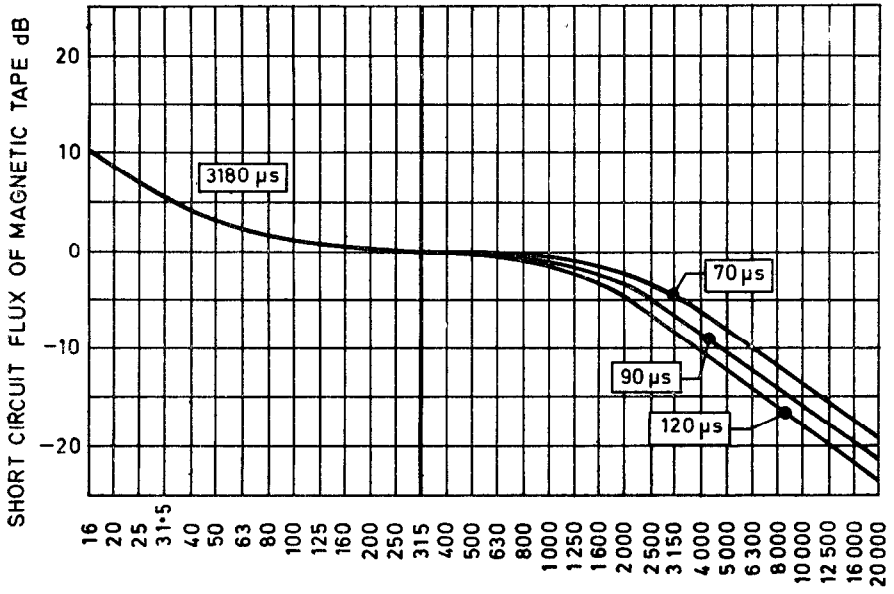
9.1.2 Time Constants

Use	*Tape Carrier*	*Speeds in cm/s*	*Time Constants in micro seconds* t_1	t_2
Professional	Reel-to-reel	76·2	35	Infinity
			17.5	Infinity
		38·1	35	Infinity
			50	3 180
		19·05	70	Infinity
			50	3 180
Professional	Cartridge	19·05	50	Infinity

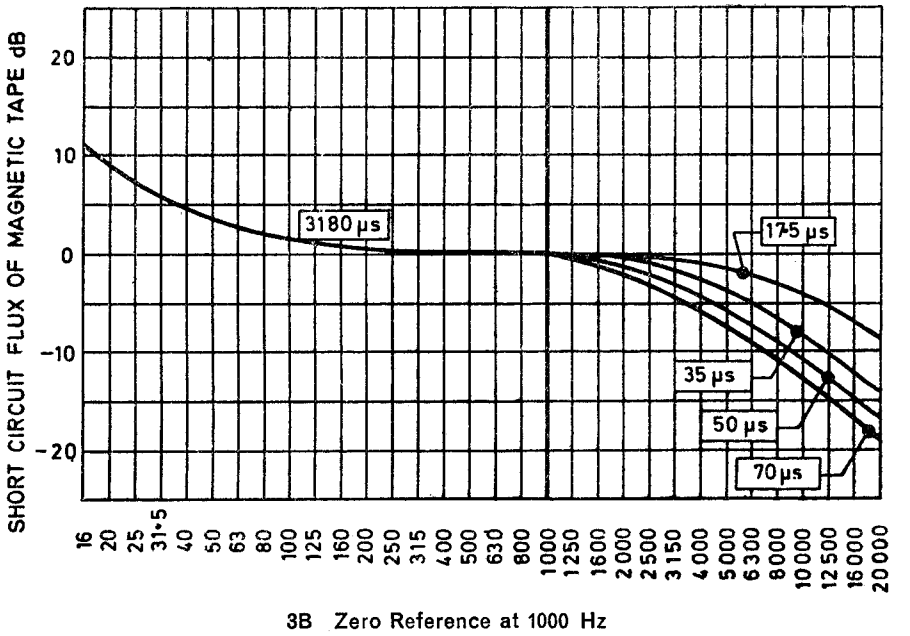
Use	*Tape carrier*	*Speeds in cm/s*	*Time Constants in micro seconds* t_1	t_2
Commercial tape records and domestic	Reel-to-reel	19·05	50	3180
		9·53	90	3 180
		4·76	120	3 180
Commercial tape records and domestic	Cartridge	9·53	90	3 180
			120	3 180
	Cassette	4·76	70	3 180*

*May be used in combination with additional sensing holes in cassette body to provide simultaneous switching of bias current and record/replay characteristic on players (for example, when using high resolution type).

NOTE — The approximate relative values are given numerically in Table 1 and shown graphically in Fig. 3.



3A Zero Reference at 315 Hz



NOTE — A correction factor has been applied to obtain zero reference at 315 Hz and 1000 Hz, as specified for calibration tapes.

FIG. 3 AMPLITUDE FREQUENCY RESPONSE OF THE RECORDED SHORT-CIRCUIT FLUX

9.2 Reproducing Electrical Amplitude/Frequency Response

9.2.1 The corresponding reproducing characteristic for each tape speed is that which gives a flat frequency response when reproducing tapes recorded in accordance to the short-circuit flux specified in **9.1**.

9.3 Tolerances on Recording and Reproducing System Characteristic

9.3.1 *For Professional Programme Exchange*

9.3.1.1 *Tolerances on relative recorded levels* — Sound tracks on magnetic tapes shall be recorded to the characteristics specified in **9.1** within the tolerances indicated in Fig. 4A.

9.3.1.2 *Tolerances for reproducing equipment frequency response* — When reproducing a sound track having a relative short-circuit flux as

specified in **9.1** the output of the reproducing equipment shall be independent of frequency within the tolerances indicated in Fig. 4A.

NOTE — The effect of fringing must be taken into account when making this measurement.

9.3.1.3 *Channel unbalance for multichannel recordings* — For multichannel recording, the level difference between any two channels at every frequency between 80 Hz and 8 000 Hz shall not exceed 2 dB. For a stereophonic pair, the level difference shall not exceed 1·5 dB.

9.3.2 *Commercial Tape Records and Domestic Use*

9.3.2.1 *Tolerances for reproducing equipment frequency response* — When reproducing a sound track having a relative short-circuit flux as specified in **9.1** the output of the reproducing equipment shall be independent of frequency within the tolerances indicated in Fig. 4B.

9.3.2.2 *Tolerances for recording/reproducing equipment frequency response* — The overall frequency response of recording/reproducing equipment shall be within the tolerances indicated in Fig. 4B.

The reference and calibration tapes used for the measurement shall be specified.

10. TAPE AND PROGRAMME IDENTIFICATION

10.1 Identification of Tape Sides

10.1.1 It is recommended that, whenever possible, the non-sensitive side of the tape be indentified.

10.2 Programme Identification

10.2.1 *For Professional Programme Exchange, Reel-to-Reel*

10.2.1.1 The beginning of a recorded programme shall be identified by one of the following methods:

a) If there is a non-magnetic identification strip, the trailing edge of the strip should precede the beginning of the programme by one second.

b) If there is no identification strip, a visual marker (preferably metal-coated) should be struck to the non-sensitive side of the tape one second before the beginning of the programme.

10.2.1.2 The length of tape corresponding to one second is calculated for the rated tape speed.

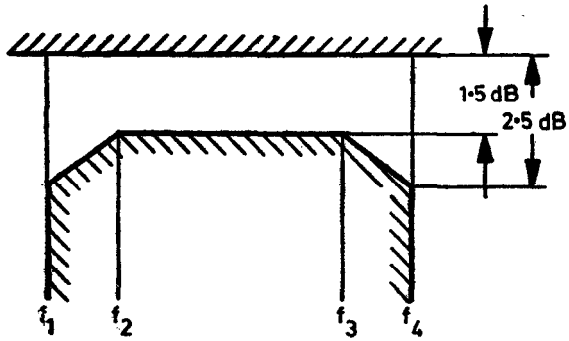
TABLE 1 AMPLITUDE FREQUENCY RESPONSE OF THE RECORDED SHORT-CIRCUIT FLUX IN DECIBELS

(*Clause* 9.1.2)

Recorded Level Related to 315 Hz Frequency Level			Frequency in Hz	Recorded Level Related to 1 000 Hz				
Time constants in microseconds				Time constants in microseconds				
t1 + t2 70 + 3 180	t1 + t2 90 + 3 180	t1 + t2 120 + 3 180		t1 = 17·5	t1 = 35	t1 = 50	t1 + t2 50 + 3 180	t1 = 70
+ 10·3	+ 10·4	+ 10·5	16	+ 0·1	+ 0·2	+ 0·4	+ 10·7	+ 0·8
+ 8·6	+ 8·6	+ 8·7	20	+ 0·1	+ 0·2	+ 0·4	+ 9·0	+ 0·8
+ 7·0	+ 7·0	+ 7·1	25	+ 0·1	+ 0·2	+ 0·4	+ 7·4	+ 0·8
+ 5·4	+ 5·5	+ 5·6	31·5	+ 0·1	+ 0·2	+ 0·4	+ 5·9	+ 0·8
+ 4·1	+ 4·1	+ 4·2	40	+ 0·1	+ 0·2	+ 0·4	+ 4·5	+ 0·8
+ 3·0	+ 3·0	+ 3·1	50	+ 0·1	+ 0·2	+ 0·4	+ 3·4	+ 0·8
+ 2·1	+ 2·1	+ 2·2	63	+ 0·1	+ 0·2	+ 0·4	+ 2·5	+ 0·8
+ 1·4	+ 1·5	+ 1·5	80	+ 0·1	+ 0·2	+ 0·4	+ 1·8	+ 0·8
+ 0·9	+ 1·0	+ 1·1	100	+ 0·1	+ 0·2	+ 0·4	+ 1·4	+ 0·8
+ 0·6	+ 0·7	+ 0·7	125	+ 0·1	+ 0·2	+ 0·4	+ 1·0	+ 0·8
+ 0·4	+ 0·4	+ 0·5	160	+ 0·1	+ 0·2	+ 0·4	+ 0·8	+ 0·7
+ 0·2	+ 0·2	+ 0·3	200	+ 0·1	+ 0·2	+ 0·4	+ 0·6	+ 0·7
+ 0·1	+ 0·1	+ 0·1	250	0	+ 0·2	+ 0·4	+ 0·5	+ 0·7
0	0	0	315	0	+ 0·2	+ 0·4	+ 0·5	+ 0·7
− 0·1	− 0·1	− 0·2	400	0	+ 0·2	+ 0·3	+ 0·4	+ 0·6
− 0·2	− 0·3	− 0·4	500	0	+ 0·2	+ 0·3	+ 0·3	+ 0·6
− 0·3	− 0·5	− 0·7	630	0	+ 0·1	+ 0·2	+ 0·3	+ 0·4
− 0·5	− 0·8	− 1·2	800	0	+ 0·1	+ 0·1	+ 0·1	+ 0·3

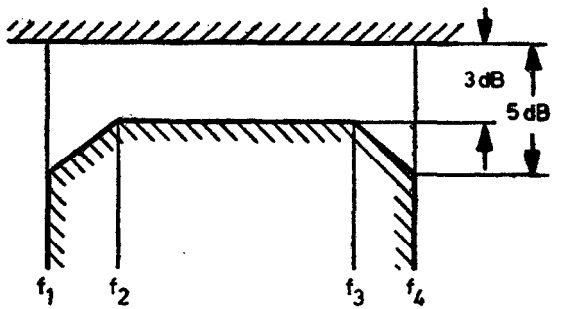
− 0·8	− 1·2	− 1·8	1 000	0	0	0	0	0
− 1·2	− 1·7	− 2·6	1 250	0	− 0·1	− 0·2	− 0·2	− 0·4
− 1·8	− 2·6	− 3·8	1 600	− 0·1	− 0·3	− 0·6	− 0·6	− 1·0
− 2·5	− 3·5	− 5·0	2 000	− 0·2	− 0·6	− 1·0	− 1·0	− 1·7
− 3·5	− 4·7	− 6·5	2 500	− 0·3	− 0·9	− 1·7	− 1·7	− 2·7
− 4·7	− 6·2	− 8·1	3 150	− 0·4	− 1·5	− 2·6	− 2·6	− 3·9
− 6·1	− 7·8	− 9·9	4 000	− 0·7	− 2·3	− 3·7	− 3·7	− 5·4
− 7·7	− 9·5	− 11·7	5 000	− 1·1	− 3·2	− 5·0	− 5·0	− 6·9
− 9·4	− 11·3	− 13·6	6 300	− 1·7	− 4·5	− 6·5	− 6·5	− 8·6
− 11·3	− 13·3	− 15·6	8 000	− 2·4	− 5·9	− 8·2	− 8·2	− 10·5
− 13·1	− 15·2	− 17·5	10 000	− 3·4	− 7·5	− 10·0	− 10·0	− 12·3
− 15·0	− 17·0	− 19·4	12 500	− 4·6	− 9·1	− 11·7	− 11·8	− 14·2
− 17·1	− 19·2	− 21·5	16 000	− 6·1	− 11·1	− 13·8	− 13·8	− 16·3
− 19·0	− 21·1	− 23·5	20 000	− 7·6	− 12·9	− 15·7	− 15·7	− 18·2

NOTE — A correction factor has been applied to obtain zero reference at 315 Hz and 1 000 Hz as specified for calibration tapes according to IS : 7068-1978 Specification for 6·25 mm calibration tape.



Tape Speed	f_1 in Hz	f_2 in Hz	f_3 in Hz	f_4 in Hz
76 cm/s	40	63	10 000	14 000
38·1 cm/s	40	63	10 000	14 000
19·05 cm/s	40	63	10 000	14 000

4A Professional Programme Exchange



Tape Speed	f_1 in Hz	f_2 in Hz	f_3 in Hz	f_4 in Hz
19·05 cm/s	40	80	8 000	14 000
9·53 cm/s	63	125	6 300	12 500
4·76 cm/s	80	160	4 000	8 000

4B Commercial Tape Records and Domestic Use

FIG. 4 TOLERANCES ON RECORDING AND REPRODUCING SYSTEM CHARACTERISTICS

10.2.1.3 At least the the reference number of the programme and the reel number shall be given either on the leader or on the spool. If information is carried on the leader it should be on the side continuous with the non-recorded side of the tape.

NOTE — A label giving the following information may accompany each reel:

a) Producing organization;
b) Programme title;
c) Reel number;
d) Total number of reels;
e) Reference number of programme;
f) Total playing time of programme;
g) Speed of tape (marked as prominently as possible);
h) Type of recording, for example, monophonic, stereophonic;
j) Information about maximum recorded level;
k) Noise reduction system, if any;
m) Number and use of tracks; and
n) Replay time constants.

10.2.2 *Cassette* — The following information may be given on the cassettes:

a) Title;
b) Catalogue number;
c) Type of recording if relevant, for example, monophonic, stereophonic and others;
d) Side identification, if relevant; and
e) Noise reduction system, if any.

10.2.3 For Domestic Use

10.2.3.1 *Reel-to-reel* — There shall be a leader tape of non-magnetic material for identification, having a colour different from that of the tape and at least 0·5 m long at the beginning of each recorded tape.

The following information may be given on the tape leader, the reel or the container of the reel:

a) Number of tracks;
b) Type of recording, for example, monophonic, stereophonic;
c) Tape speed;
d) Title;
e) Catalogue number;
f) Side identification; and
g) Noise reduction system, if any.

10.2.3.2 Cassette — Provision of **10.2.2** shall apply.

10.3 Colour of Leader Tapes

10.3.1 *For Recorded Tapes*

10.3.1.1 *For professional programme exchange: reel-to-reel* — Colour identification strips at the beginning of the reel are not specified, but it is recommended that the identification strip at the end of the reel should be red.

10.3.1.2 *The domestic use: reel-to-reel* — Provisions of **10.3.1.1** shall apply.

INDIAN STANDARDS
ON
RECORDING

IS :

1885 (Part XLVIII/Sec 1)-1978 Electrotechnical vocabulary: Part XLVIII Recording, Sec 1 Tape recording
1885 (Part XLVIII/Sec 2)-1978 Electrotechnical vocabulary: Part XLVIII Recording, Sec 2 Disk recording
2032 (Part XII)-1969 Graphical symbols used in electrotechnology: Part XII Electro-acoustic transducers and recording and reproducing systems
3956-1967 Dimensions of spools for magnetic tapes for sound recording and reproduction
4479-1967 Methods of measurements on magnetic tapes for sound recording and reproduction
4480 (Part I)-1967 Magnetic tapes for sound recording and reproduction: Part I Domestic grade
4480 (Part II)-1974 Magnetic tapes for sound recording and reproduction: Part II Professional grade
6370-1971 Tape cassettes for domestic use
6391-1971 Magnetic and ceramic phonograph pick-ups
7068-1973 Specification for 6·25 mm calibration tape
7594 (Part I)-1978 Magnetic sound tape recording and reproducing equipment (cassette) : Part I Methods of measurement
7594 (Part II)-1979 Magnetic sound tape recording and reproducing equipment (cassette) : Part II Domestic type
8152-1976 Method of measurement of speed fluctuations in sound recording and reproducing equipment
8234-1976 Spools for magnetic tapes for sound recording and reproduction
8655 (Part I)-1977 Magnetic sound tape recording and reproducing equipment (reel-to-reel) : Part I Methods of measurement
8655 (Part III)-1977 Magnetic sound tape recording and reproducing equipment (reel-to-reel) : Part III Professional type
9272 (Part I)-1979 Disk record playing equipment: Part I Record player
9272 (Part II)-1979 Disk record playing equipment: Part II Amplifiers and loudspeakers
9305-1979 Processed disk records
9551 (Part IV)-1980 High-fidelity audio equipment and systems: Part IV Record playing equipment and cartridges
9551 (Part V)-1980 High-fidelity audio equipment and systems: Part V Magnetic sound tape recording and reproducing equipment
9702-1980 Magnetic tapes for cassettes for sound recording and reproduction

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